

WASHINGTON, D. C., January 9, 1889.

To observers: Jacksonville; Jacksonville section; Savannah; Savannah section; Charleston; Wilmington; Wilmington section; Morehead City.
Hoist cautionary southwest at ten fifteen a. m. Storm-centre near Chicago, moving northeast. Winds veering to westerly with much colder, clearing weather.

GREELY.

WASHINGTON, D. C., January 9, 1889.

To observers: Norfolk; Norfolk section; Fort Monroe.
2 p. m., change to storm southwest. Storm-centre near western Lake Erie, moving eastward. Winds veering to westerly with colder, clearing weather.

GREELY.

WASHINGTON, D. C., January 9, 1889.

To observers: New Haven; New London and Newport section; Narragansett section; Wood's Holl section; Boston, Boston section; Portland; Portland section.

Hoist storm southeast at two fifteen p. m. Storm-centre near western Lake Erie, moving eastward. Heavy rain, warmer and high southeast winds, followed Thursday by clearing, much colder and high westerly winds.

GREELY.

WASHINGTON, D. C., January 9, 1889—3.10 p. m.

To observers: New York; New Haven; New London; Newport section; Narragansett section; Wood's Holl; Wood's Holl section; Boston; Boston section; Portland; Portland section; and Secretary Maritime Exchange, New York.

The storm-centre over Lake Erie is increasing in intensity and moving nearly due east. It is accompanied by violent local winds which may possibly continue as it moves eastward.

GREELY.

WASHINGTON, D. C., January 9, 1889.

To observers: New Orleans; Mobile; Pensacola; Cedar Keys.
Change storm to cautionary northwest, and signal down at sunset. Storm centre near Chicago, moving northeast. Colder, clearing weather.

GREELY.

WASHINGTON, D. C., January 9, 1889—9.02 p. m.

To observer: Eastport.
9.05 p. m. Hoist storm southeast. Severe storm central over Lake Huron, moving eastward. Heavy rains with southerly winds shifting to westerly during Thursday.

GREELY.

IV and V.—Numbers iv and v appeared on the north Pacific coast on the 10th and 11th, respectively, and after developing considerable energy were forced to the southward and westward by an extended area of high pressure, and both disappeared without passing to the eastward of the Rocky Mountains. The movement of these areas is shown on chart i.

VI.—This was the only storm of the month which passed from the Pacific coast eastward to the Saint Lawrence Valley. It was probably central near San Diego, Cal., on the morning of the 13th, after which it moved slowly over southern California, Nevada, Utah, and western Colorado, where it was central on the 15th. After the morning of the 15th the easterly movement became accelerated and by morning of the 16th the storm was central in southern Minnesota. It increased in force as it passed over Lake Superior, the barometer reaching the minimum on the afternoon of the 16th, at Prince Arthur's Landing, when the centre was near that station. The area of precipitation included the whole country east of the Rocky Mountains, the rains being very heavy in the Gulf States,

Tennessee, and the Ohio Valley. Westerly gales were severe in the Lake region, and the wind attained maximum velocities ranging from forty to fifty miles per hour along the middle Atlantic and New England coasts on the 17th, when the centre was passing from the Lake region to the Saint Lawrence Valley.

VII.—This storm was first observed as central in eastern New Mexico on the 19th, but the reports of the preceding day showed that an extended barometric trough covered the central Rocky Mountain region and on the 17th an area of low pressure appeared on the north Pacific coast. As this barometric trough moved eastward two distinct centres of disturbance were observed, one over the Gulf, and the other in the central Mississippi valley on the 20th. The disturbance farthest northward moved over the Lake region while that in the Gulf moved along the south Atlantic coast, and the two united in southern New England, causing dangerous easterly gales which were followed quickly by winds shifting to westerly during the 21st, as the storm passed northeastward as a single disturbance. The strongest gales occurred on the northern New England coast, the wind reaching a velocity of sixty-four miles per hour at Eastport, Me., on the 21st. The pressure continued to decrease during the northeasterly movement and gales continued at northern Maritime stations on the 22d.

VIII.—From the 22d to the 25th an area of low pressure existed over the Rio Grande Valley and west Gulf, but the reports were not sufficient to justify the location of the centre of disturbance until the morning of the 26th, when it was near, and to the west of, New Orleans. General rains prevailed throughout the Southern States and light snows in the upper lake region and Northwest; a second depression was central in the Lake region and a cold wave in the Missouri Valley. This storm moved rapidly towards the Ohio Valley while a secondary disturbance developed on the south Atlantic coast, both moving northeastward over parallel lines until they reached northern New England where they united and the pressure reached its minimum. The rains were generally heavy in the Southern States and Ohio Valley, and the storms were followed quickly by a cold wave which caused snow as far south as the Gulf States. The snow being light, it quickly disappeared, leaving the ground generally bare to the south of the fortieth parallel. After these two storms united the resulting disturbance was feeble, and it was difficult to trace its movements after the union.

IX.—This storm appeared north of Manitoba on the 29th and moved southeastward to Wisconsin, causing general snows in the Lake region, Minnesota, and Dakota, on the 29th and 30th. After reaching the Lake region the barometer continued to fall at the centre and the direction changed to the eastward, the storm centre passing over Lake Huron, after which it passed to the Saint Lawrence Valley where it was central at the close of the month.

NORTH ATLANTIC STORMS FOR JANUARY, 1889 (pressure in inches and millimetres; wind-force by Beaufort scale).

The paths of the depressions that appeared over the north Atlantic Ocean during January, 1889, are shown on chart i. These paths have been determined from international simultaneous observations by captains of ocean steamships and sailing vessels, received through the co-operation of the Hydrographic Office, Navy Department, and the "New York Herald Weather Service."

Eight depressions have been traced, of which four were continuations of storms which first appeared over the American continent; two apparently developed over mid-ocean; one is given a probable track eastward from off the Labrador coast, and one moved east-northeast from the vicinity of the Bahamas, over or near Bermuda, and disappeared over the ocean west of the Azores. The depressions pursued normal east-northeast to northeast tracks, except number 1, which assumed a southerly course over mid-ocean, and number 7,

which passed southeastward over Newfoundland during the 18th and 19th. But one storm is traced over the ocean south of the forty-fifth parallel, although three depressions advanced along the immediate coast of the United States. Over the eastern part of the ocean generally fair weather prevailed, except from the 7th to 16th, inclusive, when low and fluctuating pressure and gales of varying force were reported. Over mid-ocean unsettled weather prevailed during the first two decades, while during the last ten days of the month the pressure continued generally high, and no storms of marked violence were noted. To the westward of the fiftieth meridian stormy weather prevailed from the 1st to 3d, 6th to 13th, 18th to 22d, and 28th to 30th.

In January, 1888, nine depressions were traced, of which six advanced eastward from the American continent north of the fortieth parallel; one developed over mid-ocean between the

fortieth and forty-fifth parallels, and moved east-northeast to the British Isles; one was given an approximated track from the vicinity of the Azores southwestward to the thirty-ninth meridian, and thence northward, and one passed south of east over the British Isles. Six of the depressions pursued normal paths.

In January, 1889, the depressions numbered two less than the average for the preceding six years, and were, as a whole, deficient in energy. The lowest barometer readings were noted over mid-ocean on the 16th, when the minimum apparently fell to about 29.00 (737).

Storms of considerable strength occurred off the coast of the United States, attending the passage of low areas i, vii, and viii α . Two depressions, numbers 3 and 4, traversed the ocean from coast to coast.

The following are brief descriptions of the depressions traced:

1.—This depression advanced eastward from off the Labrador coast, and on the 2d was central in about N. 55°, W. 38°, with strong to whole gales to the fortieth parallel. By the 3d the storm-centre had moved slowly eastward with an appreciable decrease in energy, and by the 4th had recurved southward to the fifty-first parallel, after which it passed northeastward beyond the region of observation, with an apparent increase in strength.

2.—This depression first appeared over mid-ocean on the 6th, whence it moved east-northeast and disappeared north of the British Isles after the 7th. The depression augmented in energy during its passage, and on the 8th barometric pressure falling below 29.20 (741.7) was reported off the south and west coasts of Ireland.

3.—This depression was a continuation of low area i, which moved from the Gulf of Mexico, where it was central on the morning of the 4th, to Nova Scotia by the 8th, attended from the 6th to 8th, inclusive, by fresh to strong gales north of the thirtieth parallel. By the 9th the centre of disturbance had advanced to the east of Newfoundland, and from that locality passed rapidly east-northeast to the vicinity of the thirtieth meridian by the 10th, after which it apparently recurved to the south of east and disappeared over the British Isles.

4.—This depression was a continuation of low area iii, which acquired remarkable intensity during its passage over the Lake region on the 9th, and passed thence to the north of the Gulf of Saint Lawrence by the 11th. On the morning of the 12th the storm was central northeast of Newfoundland, without evidence of marked energy, whence it moved east-northeast and disappeared over the British Isles after the 15th, attended throughout by gales of moderate strength.

5.—This depression appeared about midway between the Bahamas and Bermuda on the 14th, whence it advanced east-northeast to about the sixtieth meridian by the 15th, after which its course cannot be accurately determined, owing to an absence of reports from the region west of the Azores. It is not improbable, however, that the storm-centre moved rapidly northeastward, and that number 6 was its continuation. The depression evidently possessed marked energy, as gales of hurricane force were encountered near its path on the 14th.

6.—This depression apparently developed over mid-ocean near the fiftieth parallel on the 16th, and thence moved northeastward and disappeared north of the region of observation after the 17th, attended by fresh to strong gales, and on the 16th by pressure falling to about 29.00 (737), the lowest readings reported during the month.

7.—This depression was a continuation of low area vi, and moved from north of the Gulf of Saint Lawrence southeastward over Newfoundland, where it was central on the 19th. During the following two days the storm-centre advanced eastward, and after the 21st apparently dissipated over mid-ocean, having shown a gradual decrease in energy after leaving Newfoundland.

8.—This depression was a continuation of low area viii and viii α , which caused gales of considerable violence off the middle Atlantic and New England coasts during the 27th and 28th.

On the 29th the storm was central over the Gulf of Saint Lawrence, and by the 30th advanced northeast over Newfoundland, after which it disappeared north of the region of observation.

OCEAN ICE IN JANUARY.

No ice was reported during the month. In January, 1888, two bergs, one very large, were observed in N. 45° 20', W. 50° 01', on the 31st, and an ice bank was seen to the northward of that position. In January, 1887, a medium-sized berg was reported in N. 48° 30', W. 46° 00', on the 30th. In January, 1886, several icebergs were reported off the southeast coast of Newfoundland. In January, 1885, icebergs were reported between W. 45° 30' and W. 42° 24', none being observed south of the forty-seventh parallel. In January, 1884, icebergs were observed about four degrees farther west, and eleven days later (on the 24th) than in January, 1885. In January, 1883, the first icebergs were seen in N. 47° 35', W. 45° 04' on the 30th, and in the corresponding month of 1882 the first icebergs were reported in N. 47° 30', W. 48° 35', on the 30th.

From the above it will be seen that the entire absence of Arctic ice in the vicinity of Newfoundland during January, 1889, constituted an unusual feature.

FOG IN JANUARY.

The following are limits of fog-areas on the north Atlantic Ocean during January, 1889, as reported by shipmasters:

Entered.		Cleared.		Entered.		Cleared.	
Date.	Lat. N. Lon. W.	Lat. N. Lon. W.	Date.	Lat. N. Lon. W.	Lat. N. Lon. W.		
5	42 40 59 16	42 32 61 07	18	33 45 77 28	33 25 78 12		
7	42 38 61 57	42 25 62 15	18-19	42 50 60 23	42 38 62 16		
7	40 16 69 00	40 22 69 25	18-19	43 00 60 00	43 00 64 00		
7	42 01 62 26	41 54 62 51	18-19	43 45 56 31	42 58 59 27		
8	44 28 53 39	43 23 56 50	20	31 46 80 20	32 05 80 25		
8	44 45 61 52	Halifax harbor.	20	47 25 47 30	46 40 49 10		
9	45 28 49 40	44 35 52 55	23-24	Halifax harbor.	Halifax harbor.		
9	46 56 46 48	46 50 47 12	26-27	37 10 74 32	37 24 76 36		
9-10	45 00 46 10	43 30 54 30	27	40 40 68 15	40 35 69 00		
10	45 56 49 49	45 02 52 04	27	39 18 74 28	40 27 73 58		
10	44 03 55 02	44 00 55 12	27	43 34 64 29	20' 0 Cape Cod Lt		
10	47 27 43 58	47 05 44 54	27	37 30 74 45	35 30 75 10		
10-11	46 16 47 38	46 00 48 34	28	45 24 58 17	45 05 59 23		
			28	43 18 59 00	43 12 60 45		

The limits of fog-belts west of the fortieth meridian are shown on chart i by dotted shading. In the vicinity of the Banks of Newfoundland fog was reported on five days, as compared with nine days for December, 1888, and nine days for January, 1888. Between the fifty-fifth and sixty-fifth meridians fog was reported on ten days, as compared with four days in December, 1888, and two days in January, 1888. To the westward of the sixty-fifth meridian fog was reported on five days, as compared with three days in December, 1888, and seven days in January, 1888. As compared with the preceding month a decrease in fog frequency is shown near the Newfoundland Bank, while to the westward of the fifty-fifty meridians there has been a marked increase. The southern limits of fog remain materially the same, except along the immediate coast of the United States, where, in January, 1889, it was reported as far south as the thirtieth parallel. On the 8th a dense fog occurred at Jacksonville, Fla., which continued from the early morning until 9 a. m.

On the several dates on which fog was reported over or near the Banks of Newfoundland the general meteorological conditions were as follows: 8th, storm central over Nova Scotia, south to east winds and fog over the Grand Banks; 9th, storm-centre passed east-northeast over the southern extremity of Newfoundland and the northern part of the Banks, attended by fog in the southeast quadrant; 10th, storm of great strength central in the Saint Lawrence Valley, south to east winds and fog south of Newfoundland; 11th, storm central north of Newfoundland, and fog over the Banks; 20th, storm central east of the southern extremity of Newfoundland and fog over the Grand Banks. To the south and southeast of Nova Scotia fog attended the approach or passage to the

northward of areas of low pressure, except on the 23d and 24th, when high pressure and variable winds prevailed. To the westward of the sixty-fifth meridian the following conditions attended the development of fog: 7th, storm central off New England coast, fog to the southward in the trans-Atlantic tracks; 18-19th, storm of considerable strength passed

over the Gulf of Saint Lawrence and Newfoundland, fog off the coast and along the trans-Atlantic tracks between the sixtieth and sixty-fifth meridians; 20th, fog off the coast of Georgia, with easterly winds, and storm central over the Gulf of Mexico; 26-27th, fog off the middle Atlantic coast, storm moving northeast over the south and middle Atlantic states.

TEMPERATURE OF THE AIR (expressed in degrees, Fahrenheit).

The distribution of mean temperature over the United States and Canada for January, 1889, is exhibited on chart ii by dotted isotherms. In the table of miscellaneous meteorological data the monthly mean temperatures and the departures from the normal are given for stations of the Signal Service. The figures opposite the names of the geographical districts in the columns for mean temperature show the averages for the several districts. The normal for any district may be found by adding the departure to the current mean when the departure is below the normal and subtracting when above.

The mean temperature was highest over southern Florida, where it rose to 70° at Key West. Along the Atlantic coast south of the thirty-fourth parallel, at stations on the east, middle, and west Gulf coast, over southern California and southwestern Arizona, at San Francisco, Cal., and in the Sacramento Valley between Red Bluff and Sacramento, mean values rising above 50° were reported. The lowest mean temperatures were recorded in Manitoba where they fell below 5°. The mean temperature fell below 10° over northwestern Minnesota, northern Dakota, northeastern Montana, and at stations along or near the eastern limit of the middle plateau region of the Rocky Mountains. To the northward of a line traced from the New England coast north of Boston, Mass., south-southwestward to southern New Mexico, and to the eastward of this line continued irregularly northwestward to north-central California, and thence northward through central Oregon and Washington, the mean temperature fell below 32°.

The mean temperature was generally above the normal along the immediate Pacific coast from British Columbia to Lower California, and over all districts east of the Rocky Mountain regions, except at stations in southern and western Texas, and over eastern and southern Florida, where slight deficiencies were shown. The greatest departures above the normal were noted at stations in northern Minnesota and northern Dakota, and the British Possessions to the northward, where they exceeded 10°, from which region they become gradually less marked eastward and southward. Along the Pacific coast the departures above the normal were very small. Over a greater portion of the Rocky Mountain region the mean temperature was deficient, the greatest departures below the normal occurring in the middle plateau district, where they amounted to more than 5°, the greatest deficiency being noted at Winnemucca, Nev.

The following are some of the most marked departures from the normal at the older established Signal Service stations:

Above normal.		Below normal.	
Saint Vincent, Minn.....	15.7	Winnemucca, Nev.....	11.4
Duluth, Minn.....	13.6	Salt Lake City, Utah.....	6.6
Bismarck, Dak.....	12.7	Boise City, Idaho.....	6.1
Escanaba, Mich.....	11.4	El Paso, Tex.....	2.5
Saint Paul, Minn.....	10.2	Santa Fe, N. Mex.....	2.4

DEVIATIONS FROM NORMAL TEMPERATURES.

The following table shows for certain stations, as reported by voluntary observers, (1) the normal temperature for a series of years; (2) the length of record during which the observations have been taken, and from which the normal has been computed; (3) the mean temperature for January, 1889; (4) the departure of the current month from the normal; (5) and

the extreme monthly means for January during the period of observation and the years of occurrence:

State and Station.	County.	(1) Normal for the month of Jan.	(2) Length of record.	(3) Mean for Jan., 1889.	(4) Departure from normal.	(5) Extreme monthly mean temperature for January.			
						Highest.	Year.	Lowest.	Year.
Arkansas.			Years						
Lead Hill.....	Boone.....	30.6	7	38.1	+7.5	38.5	1882	24.2	1886
California.									
Sacramento.....	Sacramento.....	46.9	23	43.7	-3.2	52.7	1873	39.4	1888
Colorado.									
Fort Lyon.....	Bent.....	23.7	19	19.5	-4.2	32.3	1880	13.0	1875
Connecticut.									
Middletown.....	Middlesex.....	24.1	21	32.6	+8.5	32.6	1889	17.3	1888
Florida.									
Merritt's Island.....	Brevard.....	61.0	6	61.0	0.0	67.1	1885	55.3	1886
Georgia.									
Forayth.....	Monroe.....	47.6	15	49.2	+1.6	59.4	1880	40.8	1884
Illinois.									
Peoria.....	Peoria.....	24.0	33	30.6	+6.6	40.9	1880	13.5	1857
Riley.....	McHenry.....	17.4	33	24.0	+6.6	33.2	1880	5.5	1875
Indiana.									
Vevay.....	Switzerland.....	30.4	23	37.0	+6.6	47.2	1880	23.0	1884
Iowa.									
Cresco.....	Howard.....	8.3	17	17.6	+9.3	26.1	1880	-1.3	1883
Monticello.....	Jones.....	15.5	20	22.3	+6.8	32.9	1880	6.0	1883
Logan.....	Harrison.....	17.5	15	24.1	+6.6	34.4	1880	7.1	1886
Kansas.									
Lawrence.....	Douglas.....	26.3	26	30.3	+4.0	41.2	1880	14.3	1886
Wellington.....	Sumner.....	24.7	9	33.4	+8.7	40.4	1880	17.6	1886
Louisiana.									
Mount Pleasant.....	Tensas.....	47.3	9	47.3	0.0	57.9	1880	38.5	1886
Maine.									
Gardiner.....	Kennebec.....	17.7	48	26.7	+9.0	26.7	1889	7.1	1844
Maryland.									
Cumberland.....	Allegany.....	29.4	30	34.7	+5.3	39.0	1880	19.6	1865 '67
Massachusetts.									
Amherst.....	Hampshire.....	23.1	53	32.3	+9.2	32.3	1889	13.5	1857
Newburyport.....	Essex.....	23.8	13	32.7	+8.9	33.1	1880	13.7	1857
Somerset.....	Bristol.....	25.8	16	34.2	+8.4	35.7	1880	19.4	1888
Michigan.									
Kalamazoo.....	Kalamazoo.....	20.3	13	29.3	+9.0	36.0	1880	14.0	1881
Thornville.....	Lapeer.....	20.8	12	29.0	+8.2	35.6	1880	15.6	1881
Minnesota.									
Minneapolis.....	Hennepin.....	7.8	24	20.2	+12.4	23.2	1880	-4.4	1875
Montana.									
Fort Shaw.....	Lewis & Clarke.....	15.8	19	24.2	+8.4	29.1	1872	-2.2	1875
New Hampshire.									
Concord.....	Merrimack.....	20.6	24	29.2	+8.6	29.2	1889	13.2	1857
New Jersey.									
Moorestown.....	Burlington.....	28.9	15	35.5	+6.6	38.7	1880	22.2	1867
South Orange.....	Essex.....	28.0	18	33.6	+5.6	37.6	1880	23.8	1884
New York.									
Cooperstown.....	Otsego.....	19.8	35	27.0	+7.2	31.6	1880	10.3	1857
Palermo.....	Oswego.....	20.3	35	28.0	+7.7	29.4	1863 '80	11.6	1888
North Carolina.									
Lenoir.....	Caldwell.....	35.5	17	38.1	+2.6	46.0	1880	30.2	1882
Ohio.									
N'th Lewisburgh.....	Champaign.....	27.2	57	33.6	+6.4	41.0	1880	14.0	1856 '57
Wauseon.....	Fulton.....	22.2	19	29.4	+7.2	37.7	1880	12.2	1875
Oregon.									
Albany.....	Linn.....	37.3	11	40.0	+2.7	43.8	1887	22.8	1868
Eola.....	Polk.....	37.3	18	38.0	+0.7	42.7	1874	29.7	1875
Pennsylvania.									
Dyberry.....	Wayne.....	20.4	24	(1)	(1)	30.7	1880	13.9	1865
Grampian Hills.....	Clearfield.....	22.3	24	28.8	+6.5	35.0	1880	16.1	1867
Wellsborough.....	Tioga.....	24.1	9	30.0	+5.9	35.2	1880	19.1	1884
South Carolina.									
Statesburgh.....	Sumter.....	44.1	7	46.8	+2.7	49.8	1882	39.0	1886
Tennessee.									
Austin.....	Wilson.....	36.4	20	40.4	+4.0	53.1	1880	28.2	1884
Milan.....	Gibson.....	32.1	5	39.5	+7.4	39.5	1889	27.5	1886
Texas.									
Fort Concho.....	Tom Green.....	43.3	15	46.3	+3.0	58.5	1880	35.8	1885
New Uln.....	Austin.....	50.0	15	51.4	+1.4	63.7	1880	34.8	1875
Vermont.									
Stratford.....	Orange.....	14.9	15	25.4	+10.5	25.4	1889	6.9	1888
Virginia.									
Bird's Nest.....	Northampton.....	39.2	20	41.2	+2.0	49.4	1880	33.7	1881
Wytheville.....	Wythe.....	35.6	23	36.0	+0.4	44.0	1880	29.0	1884
West Virginia.									
Helvetia.....	Randolph.....	31.6	11	35.2	+3.6	43.1	1880	26.1	1884
Wisconsin.									
Madison.....	Dane.....	16.4	26	22.6	+6.2	33.6	1880	4.1	1875
Washington.									
Fort Townsend.....	Jefferson.....	39.2	17	38.3	-0.9	55.4	1888	29.6	1869

(1) Report not received.